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IMPLEMENTING EDUCATION FOR SUSTAINABLE DEVELOPMENT AS A GUIDING PRINCIPLE IN FASHION DESIGN HIGHER EDUCATION.

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ABSTRACT | This doctoral research explores ESD implementation in higher education of fashion and apparel design in Germany and Iran using a design-based research (DBR) model. It encompasses multiple phases, with this paper covering the first two: a systematic literature review and qualitative document analysis of B.A. and M.A. fashion and apparel design curricula. The following phases will involve DBR iterative processes. Initial findings reveal limited research in Germany and Iran on this topic. Nine German universities have integrated sustainability-oriented aspects into their curricula, while five have not. In contrast, Iranian universities allocate only three modules to sustainability-oriented content, indicating varying levels of integration between the two countries.

1. Introduction

Programs embracing Education for Sustainable Development (ESD) not only enhance students' sustainability knowledge but also cultivate skills essential for their future careers (García-González et al., 2020; Brandt et al., 2021). Additionally, UNESCO's 2030 map mandates higher education curricula to embrace the ESD approach (UNESCO, 2020). Fashion education is no exception due to its significant global impact (McKinsey and Company, 2023). Given the various approaches to sustainable fashion transformation, product design education is paramount, especially with initiatives like the Digital Product Passport and the EU's provisional agreement on sustainable and circular products (European Commission, 2023). These developments underscore the need for education to align with ESD principles, equipping future designers and educators with essential knowledge for a more sustainable industry.

Considering Germany's leading role in European fashion markets (Oxford Economics, 2023) and the growth of Iranian fashion retailers and brands despite economic sanctions (Nabati, 2022), it is important to explore the implementation of ESD in fashion and apparel design B.A. and M.A. programs in both countries. Furthermore, the status of ESD implementation in several universities of fashion and apparel design programs in Germany and Iran has remained unexplored despite the need to shift to a holistic approach. This doctoral research aims to answer the following research question by researching fashion and apparel design programs in Germany and Iran: How to contribute to a sustainable clothing design by implementing ESD as a guiding principle in fashion design higher education? The research map consists of several phases, which will be described in the next section.

2. Methodology

This doctoral research utilizes a design-based research (DBR) model, integrating research and practice (Grunau & Gössling, 2020) through iterative interventions. It follows a six-phase process (Figure 1) derived from the DBR model (Oppl et al., 2022) to analyze the problem, identify, develop, and evaluate ESD implementation practices in fashion and apparel design programs in Germany and Iran.

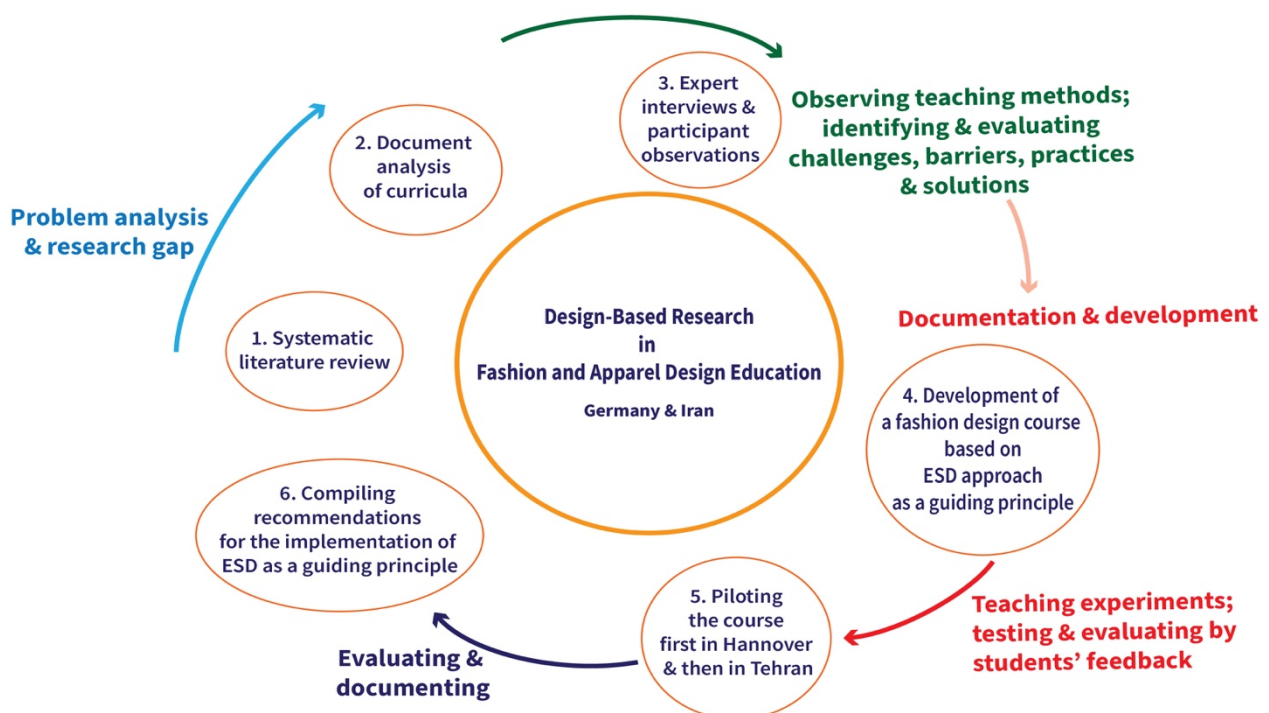


Figure 1. Concept map of DBR approach. Source: authors.

Mayring's deductive-inductive content analysis is a widely used method in various research phases, and MAXQDA software is commonly employed for data analysis. Phases one and two of the research have been conducted, and their results have been analyzed. After delving into the first two phases, an overview of other phases are described in this section.

2.1 Systematic Literature Review

Following Paul and Criado's systematic literature review guidelines (2020), ESD in higher education of fashion and apparel design in Germany and Iran was assessed through material collection, descriptive analysis, category selection, and material evaluation (Mayring, 2022). Publications in German, Persian, and English language were reviewed from January to September 2023, using specified inclusion and exclusion criteria (Figure 2).

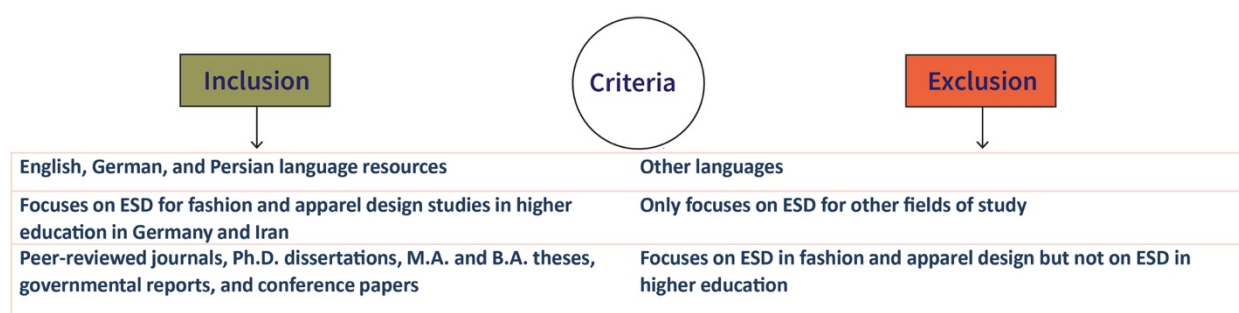


Figure 2. Inclusion and exclusion criteria. Source: authors.

The publications underwent a three-phase screening process, resulting in 13 publications for Germany and two publications for Iran on the implementation of ESD in higher education of fashion and apparel design programs. The results of this phase identify the research gap and analyze the problem (See Section 3.1).

2.2 Document Analysis of Curricula

Curricula from 14 German universities and the Iranian Ministry of Science, Research, and Technology were collected online. German universities offer distinct fashion design curricula, while all Iranian universities follow one curriculum. The gathered German ($n = 23$ documents) and Persian ($n = 2$ documents) curricula were translated and analyzed in English using MAXQDA software. Mayring's (2022) content analysis method was employed, initially selecting categories based on theoretical frameworks such as a didactic model (Ermer, 2018), triple bottom line (Gimenez et al., 2012), and ESD competencies (Rieckmann, 2022). The subsequent deductive-inductive analysis resulted in the elimination of categories like "participatory learning" and "transdisciplinary learning," while new categories like "sustainable product development," "sustainable textile chain," and "sustainable design strategies" emerged (Figure 3).

Main Categories		
Sub-categories	Sustainability-oriented content	Sustainability-oriented competencies
	1.Environmental aspects of sustainability	1. Critical thinking ability
	2. Social aspects of sustainability	2. Problem-solving ability
	3. Economic aspects of sustainability	3. Collaboration ability
	4. Sustainable textile chain	
	5. Sustainable design strategies	
	6. Sustainable product development	
Sustainability-oriented learning methods		
		1. Project-based learning
		2. Interdisciplinary learning

Figure 3. Categories formed during deductive-inductive content analysis. Source: authors.

Throughout the study period, the documents (e.g., the curricula of Iranian universities were replaced by the revised versions), and the coding process was reviewed and updated by the authors in monthly meetings from May to December 2023. In the results of this phase, the status of ESD integration in the curricula of fashion and apparel design programs is identified (See Section 3.2).

2.3 Expert Interviews and Participant Observations

The third phase of the DBR model involves conducting problem-centered expert interviews (Döringer, 2020) with fashion design lecturers and professors in Germany and Iran and fashion design students and graduates at Hochschule Hannover University of Applied Sciences and Arts (HSH), along with participant observations for fashion design courses at HSH in Hannover, Germany. To understand the adoption of ESD in higher education studies of fashion and apparel design, twenty professors and lecturers in Germany and eleven professors in Iran were contacted, resulting in interviews with nine in Germany and six in Iran so far. Interviews with HSH students and graduates aim to evaluate sustainability integration and gather feedback on teaching methods. Additionally, participant observations (Kawulich, 2005) were conducted for two winter semesters in 2022 and 2023, recording classroom interactions and course content. These activities aim to identify and evaluate practices for implementing ESD in fashion design courses. Moreover, the doctoral student gained teaching experience at HSH, developing and testing sustainability-oriented course concepts and teaching methods for fashion design education in Germany.

Phases four and five focus on developing and evaluating a fashion design course, using the ESD approach along with additional teaching experiments. The doctoral student will define the course content and structure based on analyzed data. Supervisors, experts in education and design, will review and provide feedback on the course framework before piloting at HSH and gathering student feedback. The course will then be revised for implementation in a fashion design program at a university in Tehran, supported by student portfolio assessment and course evaluation. These phases encompass development, piloting, evaluation, and analysis, with recommendations compiled from all phases on implementing ESD in fashion and apparel design higher education.

3. Results

3.1 Results of Systematic Literature Review

Ermer (2018) proposed a holistic framework for learning sustainability in fashion design. Ermer and Schwarzkopf (2021) analyzed curricula from five German universities offering a B.A. in fashion design, finding only one directly addressing sustainability. The EU-funded project Fashion DIET aims to implement ESD as a guiding principle in fashion and textile study programs. Researchers from four universities in Germany, Romania, and Bulgaria developed an ESD module with 42 courses for higher education, provided as an Open Educational Resource on the Glocal Campus platform (Grundmeier & Höfer, 2023).

In comparison, only two publications in Iran's fashion and apparel design context discuss sustainability. Davari et al. (2016) surveyed female students in textile, apparel, and industrial design programs, revealing a lack of awareness and anti-sustainability attitudes among peers. Rezvani Ahangar Kolaei et al. (2021) focused on female undergraduate students at Shariati Technical and Vocational University, designing courses to enhance sustainable clothing design skills. However, they did not address ESD implementation in the curriculum. Iran's fashion industry is heavily influenced by socio-political factors (Shirazi, 2019), impacting sustainability efforts. Navigating these complexities requires a nuanced understanding of cultural and political realities and the educational system.

3.2 Results of Document Analysis of Curricula

In the analysis of German university curricula, sub-categories are grouped into sustainability-oriented content, competencies, and learning methods. Social and environmental aspects of sustainability are more prevalent than economic aspects (Uni01-BA, 2019; Uni02-BA, 2022; Uni04-BA, 2017; Uni05-BA, 2021; Uni08-MA, 2021; Uni11-BA, 2014; Uni13-BA, 2022; Uni14-MA, 2023). Sustainable textile chain and product development have low frequencies after critical thinking ability (Uni01-BA, 2019; Uni04-BA, 2017; Uni13-BA, 2022), with sustainable design strategies being more common (Uni03-MA, 2021; Uni04-BA, 2017; Uni05-BA, 2021; Uni13-BA, 2022; Uni01-BA, 2019). Collaboration ability is the second most frequent sub-category under sustainability-oriented competencies, emphasizing teamwork (Uni02-BA, 2022; Uni03-BA, 2023; Uni05-BA, 2021; Uni13-BA, 2022; Uni14-BA, 2023). Problem-solving appears with varying frequencies, while critical thinking is less frequent (Uni02-BA, 2022; Uni05-BA, 2021; Uni13-BA, 2022; Uni14-MA, 2023). Additionally, sustainability-oriented learning methods, such as project-oriented and interdisciplinary learning, are prevalent (Uni01-BA, 2019; Uni02-BA, 2022; Uni03-BA, 2023; Uni05-BA, 2021; Uni13-BA, 2022). Some modules are titled “sustainability”, and six teach with a holistic approach (Uni01-BA, 2019; Uni03-BA, 2023; Uni13-BA, 2022; Uni02-BA, 2022).

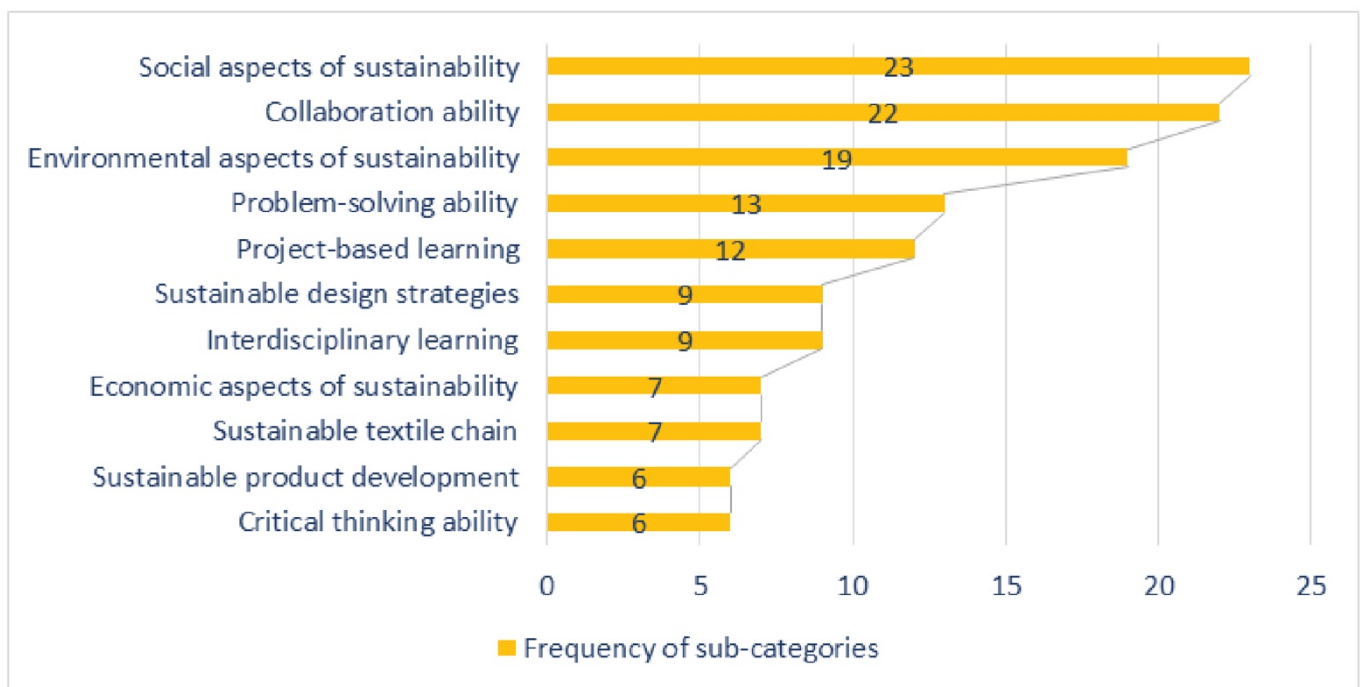


Figure 4. Frequency of sub-categories in the German universities' curricula. Source: authors.

In Iranian curricula documents, only three modules were found teaching sustainable concepts, including green or sustainable textiles, environmental sustainability of the apparel and textile industry, sustainable design, and recyclable fibers (IrUni-MA, 2023; IrUni-BA, 2023). Conversely, 11 sub-categories were identified in the 11 German curricula out of the 23 analyzed documents (Figure 4), covering all three main categories. The remaining 12 documents from five German universities did not include relevant sustainability keywords.

3.3 Initial Results of Expert Interviews

So far, three out of nine expert interviews with lecturers and professors in Germany and four out of six expert interviews with professors in Iran have been analyzed. Regarding these interviews, it can be stated that universities in Germany adopt sustainability in fashion design courses, with each university employing distinct approaches, starting from the implementation of consumer education and circular fashion

practices to curriculum changes, which encourage collaboration with other departments and industry partners. At Iranian universities, efforts to integrate sustainability into fashion design courses are evident despite the absence of dedicated courses in the curriculum. Practical projects and workshops focus on, e.g., reducing fabric waste and historically sustainable methods.

4. Discussion

The initial phases of this doctoral research comprised a systematic literature review and a curriculum document analysis. The literature review revealed limited research on ESD in higher education of fashion and apparel design in Germany and Iran. In Germany, two projects addressed ESD implementation: the Fashion DIET project, offering an online ESD further education module applicable to higher education curricula, and Ermer's publications focusing on fashion design education. However, no papers on ESD integration in higher education of apparel design curricula in Iran were found.

Secondly, the comparative document analysis of curricula highlights the integration of sustainability aspects in fashion and apparel design programs in Germany and Iran. Significant progress has been noted in German universities, with nine institutions integrating sustainability-oriented aspects into eleven B.A. and M.A. curricula by 2023, compared to previous research indicating limited sustainability focus (Ermer and Schwarzkopf, 2021). While three universities in Germany offer modules directly related to sustainability and six adopt a sustainable and holistic approach, five have yet to integrate sustainability aspects. In contrast, Iranian universities have only three instances of sustainability-oriented content in their curricula, significantly fewer than in Germany. The disparity may be attributed to differences in the educational systems of both countries. Although recent revisions to Iranian curricula show progress in sustainability integration, there remains a notable lack of focus on sustainability. Addressing these disparities and gaps in ESD integration requires further research.

Thirdly, according to the analyzed expert interviews, universities in Germany incorporate sustainability into fashion design courses with different approaches. In Iran, efforts are made to integrate sustainability into fashion design courses. However, challenges remain, including the need for updated facilities and resources to achieve comprehensive integration. As some interviews have not yet been analyzed, one of the next steps will be to elaborate and compare further expert opinions.

5. Conclusion

This doctoral research assesses the status of integrating Education for Sustainable Development (ESD) in B.A. and M.A. programs for fashion and apparel design in Germany and Iran. While limited research exists on ESD integration in German fashion design curricula, none addresses Iranian universities. Notably, sustainability aspects are integrated into nine German university curricula, whereas Iranian universities devote only a small portion to sustainability-oriented content. However, five German universities have yet to include any sustainability aspects. This stage does not conclude the research; further phases will explore ESD implementation as a guiding principle in fashion and apparel design programs.

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